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ABSTRACT

This paper notes the advantages of using e-mail in computer literacy classes, and discusses the results of incorporating an e-mail assignment in the "Introduction to Mathematical Reasoning and Computer Programming" core course at Brooklyn College (New York). The assignment consisted of several steps. The students first read and responded to an e-mail message sent by the professor. They then sent an e-mail message to at least one other student. Each student was required to save an e-mail message that was received and to print out a hardcopy of the message. As a way of introducing students to the vast resources available through the Internet, students were asked to electronically transfer a list of files on various topics by sending an e-mail request to a specified address. Selected reading materials about e-mail and online information services were also distributed to the students. The final part of the assignment was for the students to submit a written response to questions on their impression of e-mail and electronic data retrieval. Results of a student survey reveal that 77% of the students found the e-mail component of the course interesting or useful and 60% wished to retain their e-mail accounts after the semester ended. Responses to the nine survey questions are included and an appendix provides the course description. (Contains 19 references.) (AEF)

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Using E-mail in a Math/Computer Core Course

by Chaya Gurwitz

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paper

Using E-mail in a Math/Computer Core Course

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Abstract

Computer literacy courses often aim to teach general principles of computer science. One problem with such courses is that students fail to see the relevance of the material and feel that they have not learned anything useful in the real world. In this paper we describe our experience with using e-mail in an introductory course for non-majors. The course itself is prin-

ciples based, but we found that the e-mail component afforded the students the chance to see the relevance of computer science, without detracting from the overall thrust of the class. The e-mail component provided an added dimension to the class, which the students found interesting and exciting.

Introduction

Most Computer Science departments offer an introductory course geared toward students who are not planning to major in computer science. This course is generally known as a "computer literacy" course, although there is no consensus on what "computer literacy" encompasses.

In many departments, this course is a simplified version of the standard CS1 course, the introductory course for computer science majors. In such a course, the focus is on programming techniques and algorithm development (for example, [Decker, 1992]). While such a course is intellectually challenging, nonmajors often feel disappointed that the course does not teach them anything that would be "useful" in their daily lives.

In other departments, the computer literacy course is designed to introduce students to microcomputer applications, such as word processors, electronic spreadsheets and database packages (for example, [Gau and Madison, 1993]). Although students perceive such instruction as useful, in practice the course often provides little more than vocational training. Students often are not prepared to use application packages other than the ones they used in class.

In recent years, there has been a reevaluation of the computer literacy class. The current trend is to emphasize principles and concepts rather than to concentrate on specific languages or applications. A plethora of principles based courses have been suggested, all of which are designed to be appropriate for students of diverse backgrounds ([Van Dyke, 1987], [Myers, 1989], [Bierman, 1990], [Allen et. al., 1990], [Goldweber, 1994]). Reading through the literature, one gets the impression that despite all the suggestions, the course is still trying to find itself. All of the proposed courses endeavor to present concepts and long-lasting skills, while at the same time stimulate and interest students, especially those who are not planning to major in Computer Science.

We have found that introducing students in a computer literacy class to electronic mail and remote file transfer can be a useful expedient in achieving these goals. In this paper we describe our experiences with adding an e-mail component to our computer literacy course. The course itself is a principles based course, in which the topics include propositional logic, probability, information representation, programming using a subset of Pascal, and software engineering principles.

The Brooklyn College Computer/Math Core Course

Brooklyn College is one of the nine senior colleges of the City University of New York. Beginning in 1981, all Brooklyn College undergraduate students have been required to complete a ten-course, 34 credit, core curriculum [Cheney, 1989]. Core courses are designed for nonspecialists and are suitable for nonmajors, but each is meant to introduce material of fundamental and lasting significance. Core courses aim at broadening awareness and widening horizons rather than at specific career preparation.

Core Studies 5 is a 3-hour, 3-credit course entitled *Introduction to Mathematical Reasoning and Computer Programming*. It was designed jointly by the Department of Mathematics and the Department of Computer and Information Science and is aimed at non-mathematics, non-computer science and, in general, non-science majors. The course introduces such students to mathematical concepts and reasoning and it provides them with hands-on programming experience to aid in understanding the nature and power of the modern computer. This course is required of all undergraduate students, with the exception of those who have taken more advanced courses in both mathematics and computer science. The bulletin description of the course is included in the Appendix. More detailed presentations are given in [Arnow, 1991, 1994].

Brooklyn College's core curriculum has attracted attention nationwide. With support from the Andrew W. Mellon Foundation, over sixty colleges have sent observers to Brooklyn College to study the core curriculum firsthand. The core is seen as being in the forefront of a general trend of "going back to the basics". Core Studies 5 has especially aroused interest in the academic community in its attempt to teach mathematics to non-science students and to ensure that all students are computer literate.

Advantages of Using E-mail

- The most compelling reason for introducing e-mail in a computer literacy class is that the students find it interesting and exciting. We have found that it arouses the interest of students who would otherwise tune out the class.
- Facility with electronic mail will be beneficial to all students, regardless of whether or not they pursue a major in Computer Science.
- Using an electronic mail package provides a natural way to introduce students to the concepts of text editing and file manipulation in a more enjoyable context than programming or word processing. It also serves to demonstrate that not all files are programs, and to illustrate the difference between text files and program files.
- It is especially beneficial for non-mathematics, non-computer science students to become acquainted with modern technology in a friendly setting, in order to reduce their mathematics and computer science anxiety.
- Having students communicate with the instructor and with each other via e-mail fosters a sense of community that extends beyond the classroom. Enhanced communication serves to encourage peer contact and group collaboration.
- Electronic mail provides an effective means of communication for students who are insecure and are reluctant to talk in class. This is especially true for women, ([Hanchy, 1993], [Moses, 1993], [Howell, 1993]) minorities [Olagunju, 1991], and

recent immigrants. These students also benefit from the socialization afforded through the use of e-mail.

- A unit on using electronic mail can be easily integrated into any type of computer literacy course - whether a traditional programming course, or a microcomputer applications course, or a principles based course.

The E-mail Component of Our Course

The e-mail assignment we used in our class consisted of several steps:

The students first read an e-mail message sent by the professor and responded to it. They were then directed to send an e-mail message to at least one other student. Each student was required to save an e-mail message that was received and to print out a hardcopy of the message. These tasks served to familiarize the students with the e-mail software and to introduce basic file manipulation.

As a way of introducing students to the vast resources available through the Internet, we compiled a list of files representing an eclectic mixture of topics (see [Krol, 1994]). We had the students transfer the files electronically, by sending an e-mail request to *ftpt@decwrl.dec.com*. The list of choices included:

- a copy of the Declaration of Independence
- information about becoming an astronaut
- information about current Earth satellites
- information about abortion as an issue in the 1992 Presidential campaign
- a copy of the 1994 US Supreme Court decision *ABF Freight System, Inc. v. National Labor Relations Board*
- a copy of President Clinton's inaugural address
- information about weather conditions on the East Coast
- a copy of the 1994 State-of-the-Union address
- a copy of O'Henry's story, *The Gift of the Magi*
- recipes for eggplant, apple pie and chocolate cake
- a report on skiing conditions

We distributed a selection of readings about electronic mail and on-line information services. The selections were culled from the local press ([Baker, 1994], [Lewis, 1993], [Meyer, 1994], [Quinn, 1993], [Wade, 1994]). Some were chosen for topical interest, others were meant to be thought provoking.

The final part of the assignment was to submit a written report. The class was asked to respond to the following:

It has been said that the "electronic village" will change our lives - it will change the way we do business, the way we manage our finances, even the way we socialize. Your assignment is to think about how electronic mail and electronic data retrieval might or might not be useful in your life. Do you find it fascinating or infuriating? Do you think that creating the "information superhighway" is something that the government should be sponsoring? Why or why not?

Results

The e-mail assignment ignited genuine sparks of interest. Students' questions and comments developed into animated classes regarding the wide spread of computer applications and the relevance of computers to non-scientists. The mood of the class was remarkable. The students worked and joked together, both on-line and in person.

Most students did not receive the ftp files. This failure, too, provided a learning experience. In some cases the files were not received because of spelling errors, which brought home the old programming adage GIGO (Garbage In Garbage Out). In other cases the files were not received because of problems with our LAN (Local Area Network), which generated many spirited class discussions about computer networks, on-line services, and issues of privacy and security.

We introduced e-mail in one section of Core Studies 5 during the Spring 1994 semester. Figure 1 shows the results of a survey conducted in that class. Due to the overwhelming response of that class, e-mail is currently being used in fourteen sections of the course.

The results of the survey show that 77% of the students in the class found the e-mail component of the course interesting or useful. Almost 60% of the class wished to retain their e-mail accounts after the semester ended. Overall, more than 80% of the students felt that they had gained something useful from the course.

These results are especially gratifying, because many of the students in the class are computer and math -phobic. While Core Studies 5 is meant to be a freshman course, many students wait until their senior year to register for the course. We found that this class was more interested and involved than those that we have taught during the past several years. The feelings of many students are aptly characterized in the words of a recent immigrant from the former Soviet Union:

When I was on the beginning of this class I wasn't so happy as now. Why? Because, I didn't know nothing about the computer, and also about logic. I am very proud to know that right now. I know a little bit, not a lot, but I'm only on the beginning of interesting years in the college. Thank you for give me a basic skills about the computer, I hope I'll need them on the future. ... I'm very sad about that. Our class will finish and I'll never again use the email letter. Why? I want to have a good friends and send them a email message. And also, receive a message from them too. What can I do without the E-mail???

1) I found the logic portion of the course interesting and/or useful.

agree: 22 disagree: 5 no opinion: 4

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2) I found the programming portion of the course interesting and/or useful.

agree: 26 disagree: 1 no opinion: 4

3) I found the probability portion of the course interesting and/or useful.

agree: 20 disagree: 6 no opinion: 4

4) I found using e-mail interesting and/or useful.

agree: 24 disagree: 3 no opinion: 4

5) If possible, would you like to retain your e-mail account after the semester ends?

yes: 18 no: 9 don't care: 4

6) I am planning to take another CS course.

yes: 9 no way: 9 maybe at some point: 12 (1 no answer)

7) This course made me more interested in CS.

yes: 16 no: 3 no difference: 12

8) I gained something useful from this course.

yes: 25 no: 2 no opinion: 4

9) The course was better than I had expected.

yes: 20 no: 2 no expectations: 9

Figure 1: Survey of Class Opinion

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Appendix

Core Studies 5: Introduction to Mathematical Reasoning and Computer Science, 3 hours; 3 credits

Mathematical reasoning, formal mathematical systems, algorithms, and problem-solving. The nature of the computer and the use of computers in problem-solving. Introduction to computer programming.

(Not open to students who are enrolled in, or have completed, any course in Computer and Information Science or to students who have completed a Mathematics course numbered 3.20 or higher with a grade of C or higher.)

Prerequisite: A high school course in intermediate algebra or Course 2 of the New York State Sequential Mathematics Curriculum, or Mathematics 0.35 or 0.44 with a grade of at least C, or Mathematics 0.36 or 0.04, or the equivalent.

Rationale

This course develops students' abilities to reason precisely and to express and analyze real-world problems in mathematical terms. It provides opportunities for students to explore the powerful concepts of a mathematical proof and of an algorithm, and to learn a variety of formal methods and problem-solving strategies.

An understanding of the nature of a computer and of computer programs emerges. Students are given hands-on experience formulating solutions to problems, and writing and running simple computer programs to implement algorithms.

The course develops methods of reasoning that will be useful in other courses in the curriculum. It also reinforces connections between computer science and mathematics by applying the techniques and power of computing to solve mathematical problems, and by making concrete the notion of formalization, whether of a mathematical concept in a proof or of an algorithm in a program.

Frequency of Offering

Core Studies 5 is offered each semester in the day and evening programs as well as during the summer. Currently there are 28 sections with approximately 1000 students scheduled per semester.